MISSOURI CONSERVATIONIST

VOLUME 83, ISSUE 2, FEBRUARY 2022

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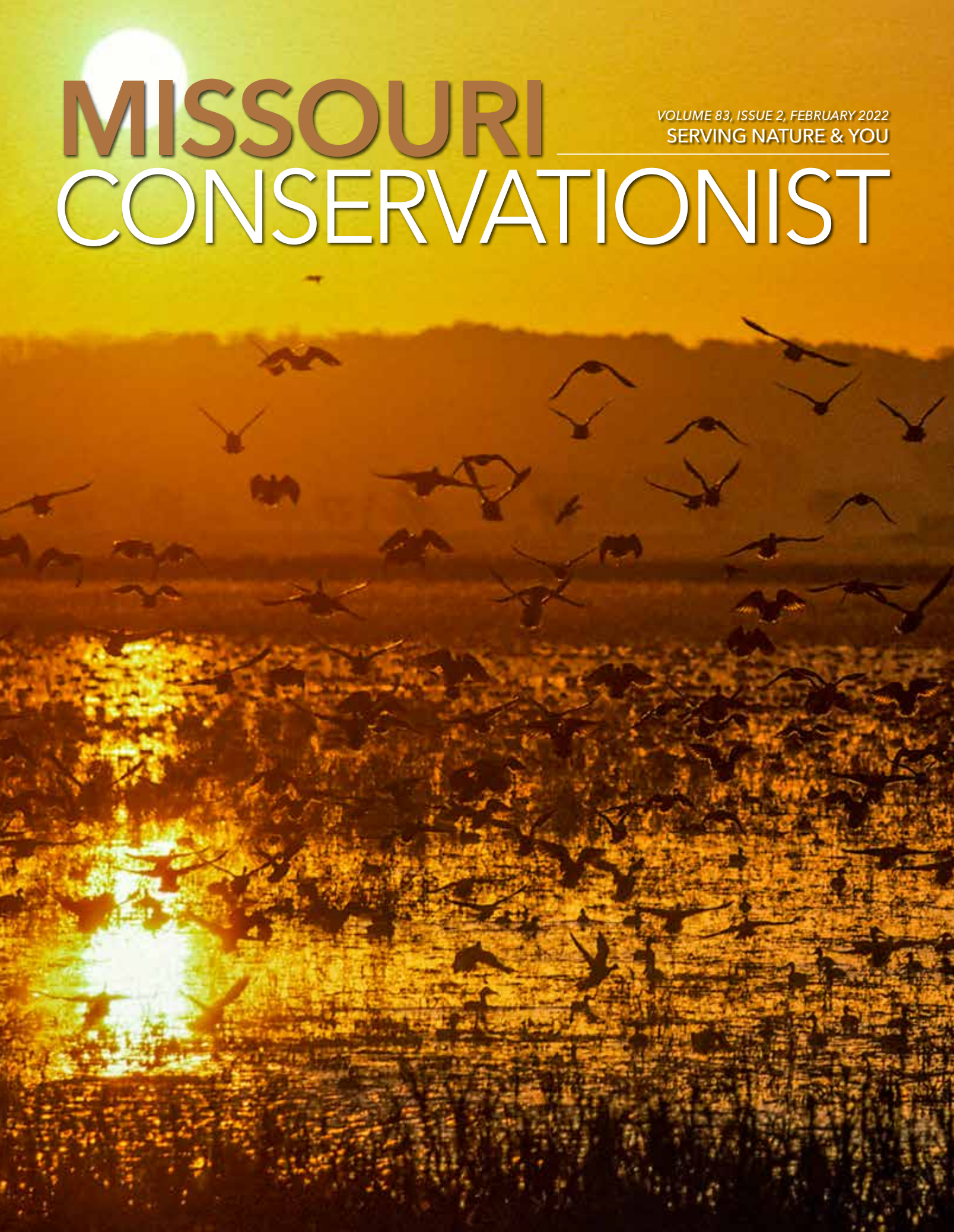

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pancakes with Missouri maple syrup, apples, and pecans

Makes 12 medium pancakes

Maple-syrup apples

2 tablespoons unsalted butter
3 large Missouri apples (peeled, cored, and cut into ½-inch-thick slices)
½ cup (or slightly more) maple syrup
½ teaspoon cinnamon

Pancakes

⅔ cup white flour
⅓ cup whole-wheat flour
2 tablespoons yellow cornmeal
2 tablespoons turbinado or brown sugar
1 teaspoon baking powder
1 teaspoon baking soda
½ teaspoon salt
1 cup buttermilk
1 cup plain low-fat yogurt
1 large egg
1½ tablespoons unsalted butter, melted
24 Missouri pecan halves, lightly toasted
Additional unsalted butter for the griddle
Additional maple syrup

For maple-syrup apples

Melt butter in a large skillet over medium-high heat. Add apples and 1 tablespoon maple syrup. Sauté for a few minutes until apples are tender. Mix in remaining maple syrup and cinnamon.

For pancakes

Whisk together dry ingredients in a large bowl. In another bowl, whisk buttermilk, yogurt, and egg together until well blended. Add to dry ingredients and stir gently until just blended.

Heat griddle over medium heat. Melt a thin coating of butter over griddle. Drop batter by ⅓ cupfuls onto griddle. Cook pancakes until brown on bottom and bubbles form on top. Flip cakes over and cook until bottoms are brown and pancakes are barely firm to the touch. Transfer to plates. Repeat with remaining batter, adding more butter to the griddle as needed. Spoon apples over pancakes and sprinkle with nuts.

Contents

FEBRUARY 2022
VOLUME 83, ISSUE 2

FEATURES

10
Meaningful Connections
Wetland conservation efforts identify bottomland ecological functions.
by Frank Nelson

16
Cave Country
One county's fight over the fate of a rare fish.
by Denise Henderson Vaughn

23
Tapping Into New Traditions
Maple sugaring sweetens outdoor activities for generations.
by Matthew Dollard

DEPARTMENTS

2 Inbox
3 Up Front With Sara Parker Pauley
4 Nature Lab
5 In Brief
28 Get Outside
30 Places To Go
32 Wild Guide
33 Outdoor Calendar


Red-bellied woodpecker

MISSOURI CONSERVATIONIST

ON THE COVER
Ducks fly over a wetland in northeast Missouri
JIM RATHERT

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Inbox

Letters to the Editor

Submissions reflect readers' opinions and may be edited for length and clarity. Email Magazine@mdc.mo.gov or write to us:

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MDC'S CANINES

The K-9 Unit is an awesome addition to MDC. Please keep us informed of the exploits of these canine conservation agents. Love the magazine!

Joe Carretero
St. Louis

MORE LOVE FOR MDC'S K-9 UNIT

Love the article on MDC'S K-9 Unit [*Paws on the Ground*, December, Page 10]. Astro looks like such a good boy! They're so smart and loyal — such a worthy program. Love your magazine. I'm convinced Missouri has the best conservation department in the country.

Andrea Piper Washington

UP FRONT ABOUT CANINES

What a tender piece by Sara Parker Pauley about her dog Yeller in the December issue of the *Conservationist* [*Up Front*, Page 3]. I so enjoy seeing the human side of people in leadership.

Marcia New Rolla

I'm a dog person and enjoyed the *Up Front* in the December issue. I also enjoyed *Paws on the Ground*. I have a beautiful German shorthair (house dog and hunter) and many people reached out to me saying, the dog on the cover looks just like your Mandy, and he does! I truly believe if Mandy hadn't gotten stuck with us, she would have done big things, but she loves us and we love her.

Melanie Selmon via email

I, too, love bird dogs. Now that I have reached 80 years old and have bad knees, I can only dream of the times on our farm in northeast Missouri hunting quail with our German shorthair named Duke. He was a great hunter and companion. When we were in the field, he was immediately at business and on the hunt. Unfortunately, he passed several years back, but I still have his picture and the First Place Shelbina Jaycees 1969 Shooting Dog trophy we earned. Great experiences.

Stan Copenhaver Peculiar

A NATURAL ZOO

I have the good fortune to be able to enjoy my coffee each morning looking westward across the Black River. I am joined by eagles that love to dive for their breakfast from their perch high in the sycamore trees along my front yard. With the deer in my yard at night, bears on the ridge behind me, and the critters all around me, it's almost like living in a zoo. I love it.

Herb Haus via email

EASY RECIPE

The recipe from the December issue is wonderful [*Venison in a Pumpkin*, Page 8]. And a great adventure to make. It takes a fair amount of time to prepare but is well worth the effort. The presentation is beautiful and the many flavors blend to make a unique, tasty late autumn meal. I thought it might be difficult to make but it was not.

Jeanette Ziegler St. Louis

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The Missouri Department of Conservation protects and manages the fish, forest, and wildlife of the state. We facilitate and provide opportunity for all citizens to use, enjoy, and learn about these resources.

Want to see your photos in the Missouri Conservationist?

Share your photos on Flickr at flickr.com/groups/mdcreaderphotos–2022 or email Readerphoto@mdc.mo.gov.

1 | Amidon Conservation Area by Rhonda Horn, via email

2 | Coyote at Lead Mine Conservation Area by valizoe1, via Flickr

3 | Gadwall by perryeck, via Flickr

Want another chance to see your photos in the magazine?

In the December issue, we plan to feature even more great reader photos. Use the submission methods above to send us your best year-round pictures of native Missouri wildlife, flora, natural scenery, and friends and family engaged in outdoor activities. Please include where the photo was taken and what it depicts.

Up Front

with Sara Parker Pauley

Now comes February — the month we celebrate love's splendor, and the season of the in-between when one might just as easily find a late winter blizzard as a warming breeze that brings with it the sound of spring peepers and chorus frogs, whose melodious notes mark the hope of winter's end and nature's resilience.

Nature is full of such in-between or transitional features."It is the nature of a stone to be satisfied," noted poet Mary Oliver. "It is the nature of a river to want to be somewhere else." And then there are these mystical transitional zones in between land and water that we call wetlands (i.e. swamps, marshes, fens, vernal pools, riparian forests) that display distinct characteristics of both aquatic and terrestrial ecosystems and are among the earth's most productive and diverse habitats.

In this month's issue, you'll read the first in a series of three feature articles scheduled for 2022 on the critical roles these "in-between" ecosystems play (Page 10) — from providing homes for wildlife, recreation for birdwatchers and waterfowl hunters, sponge and purifier of our waterways and more. These ecosystems are so vital, and yet according to the U.S. Fish & Wildlife Service, the United States is still losing wetlands at the alarming rate of 13,800 acres annually, after already losing more than half of our original wetlands since the 1780s.

Come join us this year in our pilgrimage to learn more about these precious habitats and discover the mysteries of these places in-between.

Sara Parker Pauley

SARA PARKER PAULEY, DIRECTOR
SARA.PAULEY@MDC.MO.GOV

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Nature LAB

by Dianne Van Dien

Each month, we highlight research MDC uses to improve fish, forest, and wildlife management.

Wetland managers monitor aquatic fauna by conducting periodic surveys. Approximately 128 fish species and 30 amphibian species are known to use Missouri wetlands, as well as snails, turtles, and aquatic invertebrates like crayfish and dragonfly larvae.

WETLAND MANAGEMENT

Fish and Amphibian Survey Methods

"You never know what you're going to find," says MDC Scientist Frank Nelson, describing wetland surveys for fish and amphibians. "On certain days, some sites are teeming with an array of critters, while others come up nearly empty." No matter the outcome, these surveys provide insights for managing Missouri's wetlands.

"Visual surveys alone will never tell you the whole story," Nelson explains. "It's easy to spot ducks flushing off the water, but there's a world of critters hiding in the vegetation and under the water that we can't readily see."

That's where fish and amphibian surveys come in. Monitoring these harder-to-see species is one tool of many that managers use to better conserve wetlands. With periodic sampling, they can learn how these species respond as water is moved on and off the landscape.

Estimating how much monitoring is necessary can be difficult, so Nelson, colleagues from MDC, and the University of Missouri conducted a study to evaluate the efficiency of different survey methods. They compared four common techniques: dip nets, seine nets, mini-fyke nets, and minnow traps.

Study helps wetland managers determine best survey methods for their site and goals

Over two springs and summers in 29 wetlands across the state, they looked at capture results, season, water depth, proximity to shore and vegetation, and effort required for each of these. Their findings provide guidelines that help managers choose which methods best fit their goals, budget, wetland type, and timeframe.

"A wetland manager's job is to observe throughout the seasons and years to figure out how to best manage their wetland system," Nelson says. "Through this study, we've identified the strengths and limitations of each gear for taking snapshots of what is thriving under the water."

Fish and Amphibian Survey Methods Comparison at a Glance

Factors to consider when selecting a survey method:

- What do you want to sample — fish, amphibians, or both?
- How much time do you have — one day or two?
- Are you sampling in deep or shallow water or in vegetation?
- How many people are available to conduct the survey?

Survey methods:


Dip net


Seine net


Mini-fyke net


Minnow trap

General findings:

Overall, mini-fyke nets detected the most aquatic species, but depending on the site and season, dip nets or minnow traps may be more suitable for detecting amphibian species.

FRANK NELSON

Learn more at **short.mdc.mo.gov/ZvQ**

In Brief

DAVID STONNER

MDC EXPANDS BICYCLE USE ON MANY CONSERVATION AREAS

BEGINNING FEB. 28, MDC WILL ALLOW THE USE OF BICYCLES AND ELECTRIC BICYCLES ON MANY DEPARTMENT AREA SERVICE ROADS AND MULTI-USE TRAILS

Bicycle use on our approximately 1,100 conservation areas is currently restricted to roads open to public vehicle traffic and some multi-use trails. Bicycle use is currently not allowed on conservation area service roads.

Service roads are non-public roads on MDC areas used by staff to conduct resource management activities. They are marked on online maps on the MDC website at **short.mdc.mo.gov/Z9o**. Visitors use many service roads as walking paths, but the conditions of service roads on department areas vary and are not maintained at the level of public-use trails and public roads.

Most MDC conservation areas do not have applicable service roads or multi-use trails. The regulation change affects approximately 300 MDC areas. Approximately 30 of these areas will be closed to bicycle and electric bicycle use during all portions of the firearms deer hunting season and the spring turkey hunting seasons.

Exceptions would also include service roads used by staff at fish hatcheries and other heavily used MDC areas or where bicycle use could cause damage to sensitive habitats, such as designated natural areas.

MDC defines electric bicycles as "any two-wheeled or three-wheeled device equipped with fully operable pedals, a saddle or seat for the rider, and an electric motor not more than 750 watts."

Bicyclists are expected to follow appropriate trail etiquette including yielding to pedestrians and horseback riders, maintaining a safe speed, staying on designated trails or service roads, and avoiding damaging trails by not riding in wet conditions.

Find MDC conservation areas and other MDC Places to Go online at **short.mdc.mo.gov/Z9o**.

GET HOOKED ON MISSOURI TROUT FISHING

March 1 marks the annual opening of catch-and-keep trout fishing in Missouri at the state's four trout parks: Bennett Spring State Park near Lebanon, Montauk State Park near Licking, Roaring River State Park near Cassville, and Maramec Spring Park near St. James. The catch-and-keep season at the trout parks runs through Oct. 31.

MDC operates trout hatcheries at all four parks and stocks rainbow trout daily throughout the season.

Trout anglers need a daily trout tag to fish in Missouri's trout parks. Daily trout tags can only be purchased at each of the four trout parks. Missouri residents 16 through 64 and nonresidents 16 and older also need a fishing permit in addition to the daily tag.

The cost of a daily trout tag to fish at three of Missouri's four trout parks — Bennett Spring State Park, Montauk State Park, and Roaring River State Park — is $4 for adults and $3 for those 15 and younger. A daily fishing permit for Missouri residents is $7 and $8 for nonresidents. The daily limit is four trout.

At Maramec Spring Park, the daily limit is five trout and the cost of a daily trout tag for adults is $5 and $3 for anglers 15 and younger.

Trout hatcheries are just one way that conservation pays in Missouri. MDC staff stock more than 800,000 trout annually at the state's four trout parks and approximately 1.5 million trout annually statewide. Trout anglers spend more than $100 million each year in the Show-Me State, which generates more than $180 million in business activity, supports more than 2,300 jobs, and creates more than $70 million dollars in wages. About 30 percent of Missouri trout anglers come from other states, so a substantial portion of trout fishing expenditures is "new money" for the state's economy.

Missouri also offers excellent trout fishing throughout the state on rivers and streams that support naturally reproducing trout. For more information on trout fishing in Missouri, visit **short.mdc.mo.gov/Zvy**.

Buy Missouri fishing permits from numerous vendors around the state, online at **mdc.mo.gov/buypermits**, or through MDC's free mobile app, MO Fishing, available for download through Google Play for Android devices or the App Store for Apple devices.

Ask **MDC**

Got a Question for Ask MDC?

Send it to **AskMDC@mdc.mo.gov**
or call 573-522-4115, ext. 3848.

Q: How were these Ice formations created along Pomme de Terre Lake?

➔ Pomme de Terre Lake is known for fluctuations above and below the dam. As water in the vicinity receded, the thinner ice between the trees likely dropped to the ground. The thicker ice around the trees' trunks remained behind. Although the remaining ice was thin, it was attached to the tree bark and strong enough to support a layer of snow.

Water in lakes freezes from the top down as the cold air temperature slows down the water molecules and forms a thin layer of ice. The hexagonal crystalline structure of ice increases the volume by approximately 9 percent compared to water, which causes ice to float. As the water below the top layer of ice gets colder and begins expanding, the water molecules bond to the crystalline ice structure resulting in the ice layer growing downward.

Q: Say a hunter harvested the allowed limit of two antlered deer during the archery and firearms seasons combined. Later in archery season, the same hunter harvests a third deer — a male — thus potentially exceeding the harvest limits. Alas, the hunter didn't know it was a buck because the animal already had shed its antlers! How should the Telecheck procedure be handled?

➔ In this situation, the third deer would be considered an antlerless deer, and an Archer's Hunting Permit could be legally used to record the harvest. However, the only options in the Telecheck system are "doe," "button buck," and "antlered buck" — none of which accurately describe the third harvested animal. In this case, the best thing to do would be to report the deer as an "antlered buck with 0 points."

The situation is feasible because the timing of antler drop varies from animal to animal. In an average season, some males will shed their antlers in late December, with most shedding them by early March. So, it is conceivable that a buck is missing his antlers prior to Jan. 15 — the typical end-date of Missouri's archery deer season in recent years.

OTTER TRACKS: MIKE BROWN; ICE FORMATIONS: MATTHEW SMITH

Otter tracks

Q: We saw these tracks at Eagle Bluffs Conservation Area during a big freeze in February. Are they from otters?

Yes, these are otter tracks. Telltale signs are the smooth sections where the animal slid across the snow, making a wide mark, and the fact that the tracks appear to be about 6 inches apart, which is typical for this mammal.

In water, otters are graceful and powerful swimmers. With their streamlined bodies, webbed feet, and long, tapered tails, they are extremely well-suited for an aquatic existence. On land, they commonly travel with a loping gait, but on snow and ice they alternate this with a series of slides. After a few steps forward, they slide on their bellies for 10 to 20 feet while holding all their feet backward. By running and sliding, they can cover about 16.5 miles in an hour. And they love to slide! It is probably indulged in as a social sport. Otters seem to enjoy one another's company in this pastime.

For more information, visit **short.mdc.mo.gov/4kS**.

What IS it?

Can you guess this month's natural wonder?

The answer is on Page 9.

Travis Phillips
MISSISSIPPI COUNTY CONSERVATION AGENT
offers this month's

AGENT ADVICE

The Light Goose Conservation Order opens Feb. 7 in Missouri and goes through April 30. The purpose of the order is to control the population of "light geese," which includes snow geese, blue geese, and Ross's geese. These birds are overpopulated on their breeding ground (the tundra), and their large numbers are detrimental to themselves and other species there. Hunters are required to use nontoxic shot. There is no limit on harvested birds. It is illegal to harvest birds from a vehicle or public roadway or shoot across a public roadway. Remember to obtain the proper hunting permit and receive permission before hunting on private property. For more information on the Light Goose Conservation Order, visit **short.mdc.mo.gov/4kc**.

INVASIVE SPECIES MISSOURI'S LEAST WANTED

Invasive nonnative species destroy habitat and compete with native plants and animals. Please do what you can to control invasive species when you landscape, farm, hunt, fish, camp, or explore nature.

Garlic Mustard

Garlic mustard (*Alliaria petiolata*), a biennial herb native to Europe and Asia, was first recorded in Long Island, NY, in 1868. It likely was used by settlers as food or medicine.

At 2–4 feet tall, garlic mustard is a rosette of green, roundish leaves with flowers clustered near the top and fruit pods near the bottom. When pods burst, small, black seeds are released. The small seed can be transported on vehicles, by animals, or on clothing and shoes. The seeds, which can float, can remain viable in the soil for five or more years.

Why It's Bad

Garlic mustard is extremely invasive, taking over a forest floor and crowding out native plants. It thrives in full shade or sunlight. Because each plant disperses an abundance of seeds, garlic mustard can outcompete native vegetation for light, moisture, nutrients, soil, and space as it quickly colonizes an area. Garlic mustard is unpalatable to wildlife, resulting in overbrowsing of natives.

Garlic mustard can spread quickly, which crowds out native plants.

How to Control It

Pulling For new infestations and small populations, hand pulling can be effective if done before seed dispersal.

Cutting Cut the plant a few inches above the ground just after the flower stalks have elongated, but before the flowers have opened. Repeat each year until the seed bank is exhausted.

Applying Herbicides A foliar spray of 2 percent glyphosate can be applied to individual plants in the fall or early spring when most native plants are dormant.

Burning Annual prescribed burns in spring or fall can help eliminate the plant.

To learn more about garlic mustard control, visit **short.mdc.mo.gov/ZvW**.

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BUY YOUR 2022 HUNTING AND FISHING PERMITS

Annual hunting and fishing permits expire at the end of February, including 2021 permits for small game, fishing, trout fishing, and combination hunting and fishing.

Buy Missouri hunting and fishing permits from one of many vendors around the state, online at **mdc.mo.gov/buypermits**, or through MDC's free mobile apps, MO Hunting and MO Fishing, available for download through Google Play for Android devices or the App Store for Apple devices.

Save time by buying hunting and fishing permits for multiple people in a single transaction. Select the *Additional Customer* option during the permit purchase.

Try our online permit auto-renewal service to automatically renew your permits prior to the start of the next season or permit year so you never have an expired permit when you need it most. Enrollment in auto-renewal can be done during an online permit purchase or by using the *Manage Your Account* feature.

Commercial and lifetime permits can be purchased only through the MDC Permit Services Unit by calling 573-522-0107 for an application.

DEER AND TURKEY DATES FOR UPCOMING SEASONS

2022 Spring and Fall Turkey Hunting Dates

- Spring Youth Portion: April 9–10
- Regular Spring Turkey Season: April 18–May 8
- Fall Firearms Turkey Season: Oct. 1–31

2022–2023 Archery Deer and Turkey Hunting Dates

- Sept. 15–Nov. 11 and Nov. 23–Jan. 15, 2023

2022–2023 Firearms Deer Hunting Dates

- Firearms Deer Early Youth Portion: Oct. 29–30
- Firearms Deer November Portion: Nov. 12–22
- Firearms Deer Late Youth Portion: Nov. 25–27
- Firearms Deer Antlerless Portion: Dec. 3–11
- Firearms Deer Alternative Methods Portion: Dec. 24–Jan. 3, 2023

Details on hunting regulations, harvest limits, allowed methods, required permits, and other related information will be available online and in MDC's *2022 Spring Turkey Hunting Regulations and Information* booklet and MDC's *2022 Fall Deer & Turkey Hunting Regulations and Information* booklet prior to the related seasons.

Learn more about turkey hunting in Missouri at **short.mdc.mo.gov/Ztu**.

Learn more about deer hunting in Missouri at **short.mdc.mo.gov/ZvC**.

WHAT IS IT?

NORTHERN FLICKER

The adult northern flicker's chest is adorned with distinctive, black-spotted feathers. These medium-sized birds, part of the woodpecker family, delight humans at bird feeding stations, particularly when suet is offered. Like most woodpeckers, flickers excavate nest cavities in trees, which benefit other species, like squirrels and owls, who depend on these cavities for their own nests. Their call is a sharp descending whistle, and their courtship vocalization, *wicka-wicka-wicka-wicka*, is similar to that of the pileated woodpecker.

CHRIS EVANS, UNIVERSITY OF ILLINOIS, BUGWOOD.ORG; HUNTERS, NORTHERN FLICKER: NOPPADOL PAOTHONG, COTTONTAIL RABBIT, BULLFROG: JIM RATHERT; CRAPPIE FISHING: DAVID STONNER

Meaningful CONNECTIONS

WETLAND CONSERVATION EFFORTS IDENTIFY BOTTOMLAND ECOLOGICAL FUNCTIONS

by Frank Nelson

For those of us with an appreciation for conservation and the outdoors, it is unlikely that this appreciation rests on a single touchpoint but is more likely built upon a network of memories with family and friends, outdoor endeavors and activities, and quite possibly an appreciation for the sheer existence of the wide range of plants and animals that call Missouri home. Similarly, conserving wetlands along rivers and streams is also complex and requires us to consider multiple connections at the local scale, along with the cumulative effects that occur at the larger watersheds scale.

We haven't always appreciated the complexity or the intricacy of how we influence our surroundings. We often have taken simplistic views of nature based on the belief we could manipulate and control nature to meet our purposes. Unfortunately, this strategy's track record when applied to environmental issues isn't good. By ignoring nature's inherent complexity and multiple connections, we often create bigger problems and further complications. Wetlands are part of Missouri's rivers and watersheds, and when we affect one site, it can have a ripple effect up or downstream.

Focusing on Wetland Conservation

This is the first of three articles highlighting a series of assessments, which are the first steps in implementing MDC's Wetland Planning Initiative. The initiative is guided by a strategic guidance document, which articulates our philosophy on how we plan to approach wetland conservation in the next 25 years, and an implementation plan, which serves as an invitation to partners and stakeholders to engage with us in wetland conservation.

Before pursuing these goals, we must first understand what changes have occurred, our status, and future opportunities. We have conducted three assessments to provide this understanding: a **bottomland functional assessment**, a **life history assessment of wetland-dependent animals**, and a **social assessment**. This article highlights some of the important work encompassed in the bottomland functional assessment.

Missouri's wetlands exist within the 10 million acres of bottomland that occurs across the state.

The Wetland Reserve Easement program has restored a range of wetland habitats and ecological services on over 160,000 acres of private land in Missouri.

PHOTOGRAPH BY DAVID STONNER

MALLARD, CANADA GOOSE, PROTHONOTARY WARBLER: NOPPADOL PAOTHONG

The broad riparian corridor along the lower section of the St. Francis River allows floodwaters to spread out under the canopy.

The removal of vegetation from wetland and stream habitats reduces their ability to provide clean water and other ecological services.

Undervalued and Disregarded

Wetlands have a long history in the U.S. as being undervalued and disregarded. Swamps and marshes were often viewed as wastelands that needed to be "reclaimed." Many of these "problem" areas were "solved" by ditching and draining, so the land could be developed and used for agriculture, transportation, or settlement. It wasn't until after we lost most of our wetlands that we began to realize the complicated repercussions of our simple solutions. Although a straight stream may be efficient at moving water faster from one location, it breaks connections with meandering channels and wetlands in the floodplain that would store water and reduce the damaging velocities of floods.

As part of our growing appreciation for the value wetlands can play for our rivers, watersheds, and water supplies, MDC, along with a range of state and federal partners, recently analyzed the ecological functions wetlands provide through their connections to the broader landscape in a project assessing Missouri's bottomlands. This analysis identified six different ecological functions that occur across Missouri's 10 million acres of bottomlands: flood damage reduction, streamflow maintenance, carbon sequestration, denitrification, phosphorus retention, and streambank stabilization. The focus here is on the first two, but the others are described in the sidebar, *Additional Wetland Functions* (above).

Additional Wetland Functions

Carbon Sequestration: This is the process of pulling carbon dioxide out of the air and locking it away within plants or soils for a very long time. Carbon can be stored within the biomass of trees for several hundred years. Within permanently saturated soils, carbon can be held at an order of magnitude greater for thousands of years.

Denitrification: This is the process in which excess nitrogen found in the soil or water is converted by microbes into gas. Shallowly flooded plants with nutrient rich waters in the summer are great conditions for this to occur.

Phosphorus Retention: This is the processes in which excess phosphorus is stored by plants or within the soil. This is more ephemeral and can change depending upon the time of year, soil characteristics, and degree of flooding.

Streambank Stabilization: This is the physical process of keeping the streambank soils in place and reducing the impacts of erosion. Maintaining the existence of plant communities can reduce the erosive velocity of water with their stems and hold onto soil with their dense root systems. In settings with steep slopes or extreme water velocities, engineered rock is often used.

Flood Damage Reduction

We've approached flooding in a variety of ways. In some locations we have leaned heavily on engineered flood protection levees, whereas other locations have adopted a more hands-off approach that gives the river space. This second approach acknowledges the interaction and role wetlands play within river systems when it comes to naturally reducing flood damages.

One of the more common analogies used for wetlands is that they function as shock absorbers during floods. Historically, when rivers rose and flowed over their banks, the adjacent wetlands lying in the low depressions and swales would provide a place for this water to go. These soggy spaces would have spongy soils made up of organic matter that had the extra capacity to soak up water and slowly release it during drier spells. The dense growth of plant life, including trees, shrubs, and grasses, would slow floodwaters and serve as another means of protection from the powerful scouring and eroding of land from the floodwater currents.

The size and distribution of these shock absorbing wetlands in Missouri often existed in proportion to the amount needed to absorb the energy coming downstream, with larger wetlands occurring within the broader floodplains and adjacent to our big rivers, like the Mississippi and Missouri rivers, and smaller more dispersed wetlands existing on the floodplains of our smaller rivers and streams.

In many stretches of rivers, we've reduced the amount of space water can safely spread out, degraded the organic soil content, and reduced the plant cover. As a result, strong floodwater currents can be exceptionally devastating because we lack our natural shock absorbers to slow waters and provide temporary storage. The struggle to find flood solutions hasn't been one dimensional. In recent years, agencies and communities have worked together to implement a much wider range of approaches used in the past that take advantage of the role wetlands can play in reducing flood damage. Setback levees and floodways are hybrid answers that acknowledge the need to protect certain lands, while also accepting the fact that water must go somewhere. By integrating spillways and space with strategic levees, low-velocity backwater is encouraged to slowly spread out in allocated areas, instead of unpredictable levee failures.

In the last 25 years, this strategy has been incrementally implemented as Missouri landowners have embraced the idea that flood-prone farmland is better suited for wetland conservation. The Wetland Reserve Easement (WRE) program has grown to encompass 160,000 acres across the state. Scattered in different parts of the state, complexes of public and private wetlands are once again providing the necessary shock absorbers to better handle the inevitable floods.

The New Madrid Floodway allows the Mississippi River to slowly spread out, which lessens localized damage to communities, homes, farms, and other infrastructure.

The dense vegetation within riparian corridors slows water down and reduces the erosive and damaging nature of floodwater.

FRANK NELSON; GREEN TREEFROG; MDC FILE

The seemingly small and slow release of water from headwater streams, seeps, and fens ultimately leads to the cumulative downstream flows of Missouri's larger rivers.

Small geographically isolated wetlands like this karst fen play a role in water quality, biodiversity, and streamflow maintenance.

Streamflow Maintenance

Although size may have its advantages, like in flood damage reduction, sometimes the cumulative connections of a wide range of smaller sites can be equally as important. Streamflow across Missouri is largely maintained by the contributions of the small unassuming headwater stretches where streams begin their long journey to the Gulf of Mexico. These are the locations where run-off begins to collect and head downhill. In other headwater locations, the interaction of soils, geology, and groundwater manifest themselves as springs, with water bubbling forth from the ground to form a channel. Still elsewhere, the line between water and land is murkier, with seeps and fens being these ambiguous saturated spots where flow is minimal, but the grounds stay saturated a good part of the growing season.

Whether water is running off the adjacent hills or percolating through the sub-soil to form headwater streams, the speed at which water moves through these locations is important. When it comes to water's connection to streams, slow and steady processes of infiltration win the race. When we remove grasses and trees that help the ground soak up water, runoff increases. The network of roads and ditches across the landscape add further complications by diverting surface runoff and altering groundwater movement. In many places, the combination of removing vegetation and altering surface and groundwater flows has short-circuited the slower water cycle that occurred historically. When large rains occur and are multiplied across these kinds of headwaters, the unintended consequences can be quite harmful. Instead of the life-sustaining trickle of your typical stream head, our altered watersheds generate large pulses of fast-moving, damaging water, carrying with them sediments, nutrients, and other pollutants.

Urban solutions to stormwater can include integrating native wetland plants with engineered features, like rain gardens.

Luckily, through watershed planning and implementation of conservation measures, water quality and streamflow maintenance can be improved. In parts of the state where roads are less dense and natural cover is present along drainages, ecological services like streamflow maintenance are the are the highest functioning in the state. An ancillary benefit is recognized by the booming outdoor industry centered around fishing and water recreation on these clear, spring-fed streams found in the Ozark Highlands.

Wetland Appreciation

As our appreciation grows for how wetlands work, hopefully our perspectives shift from viewing wetlands with a singular negative lens to an appreciation for their multifaceted benefits and connections to the surrounding water and land. Depending upon where you live, there are a variety of ways to support these connections. MDC private land conservationists and community conservation planners can help identify what options may exist for you and your location. Within your community, it may involve incorporating native plants as a rain garden in your own backyard to help infiltrate runoff. Supporting municipal efforts to update the stormwater system is another way to improve water storage within your community. In rural settings, enrolling in conservation programs like WRE, establishing riparian corridors, and maintaining plants in woody draws are other options that allow streams and adjacent habitats the space they need to prevent flood damage.

Just like wetlands, which vary in size and function, our actions to support — and gain the benefits of — wetlands also vary in size and function, whether it's yard-scale landscaping, community-level stormwater planning, or watershed-wide programs. In each case, we find ourselves in a position of working with, rather than against, nature. ▲

Frank Nelson is a wetland ecologist who enjoys mucking around in the swamp no matter what the season and sharing the importance of the outdoors with his kids. He is a part of the Terrestrial Habitat and Social Science Unit in Science Branch.

FRANK NELSON; LONG-TAILED SALAMANDER: JEFFREY T. BRIGGLER; SUNSET: JIM RATHERT

The grotto sculpin, which lives only in cave streams in Perry County, sparked a controversy when it was proposed as an endangered species.

PHOTOGRAPH BY NOPPADOL PAOTHONG

Cave Country

ONE COUNTY'S FIGHT OVER THE FATE OF A RARE FISH

by Denise Henderson Vaughn

A few years ago, when Perryville city officials unlocked gates to some of the 100 caves that run underneath the town, they worried what volunteer explorers might find inside.

"These city caves had not been entered for many years, and some had never been entered by anyone," said veteran caver Richard Young, a member of the Cave Research Foundation, which was conducting an assessment of water quality and cave life.

Years earlier, Young had explored one particularly large city cave and found it to be heavily polluted with mounds of soap suds, trash, and a foul odor. But as gates opened in 2015 — some 20 years later — these cave researchers wanted to know current conditions. In particular, they were searching for the grotto sculpin, a fish that lives nowhere on Earth except the lightless streams that run through caves in Perry County.

This fish was at the center of a county-wide controversy that had started after two big fish kills. The sculpin die-offs had motivated the U.S. Fish and Wildlife Service (USFWS) to begin the process of listing this rare fish as an endangered species. But county residents resisted vigorously. Some landowners worried that such a designation would prompt burdensome and expensive land-use regulations.

Tires, appliances, and trash have been used to fill sinkholes to make them safer. But polluting substances can find their way into caves, such as the mound of bubbles.

A Peek Inside Perry County

The grotto sculpin's dark, watery habitat is part of Perry County's karst topography, which is characterized by springs, sinkholes, sink basins, and caves.

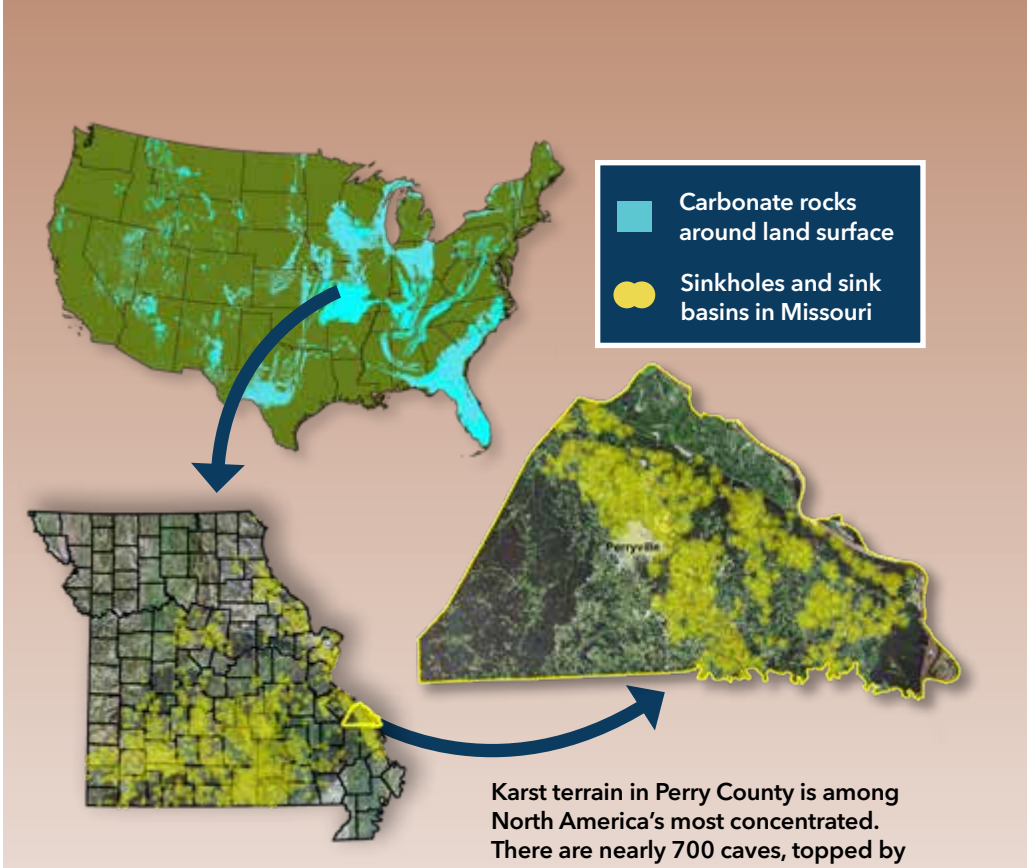
This county's geology is of national significance. Even though karst terrain underlies much of the Ozarks, Perry County sits above one of the most intensely concentrated karst regions in North America. Nearly 10 percent of Missouri's 7,000-plus known caves are found in this county, and it is home to four of the five longest known caves in the state.

In Perry County, very little stormwater drains to surface streams. Instead, a rolling karst plain stretches for more than 100 square miles. It's dotted with thousands of sinkholes that collect rainwater, filling the caves below and creating a subterranean drainage system that channels water east to the Mississippi River.

Perryville, the county seat, sits within this vast karst plain, and City Administrator Brent Buerck is only half kidding when he calls his town, population almost 9,000, "the Karst Capital of the World." Over the years, city officials have learned to cope with their unusual geology. They take advantage of the caves as natural storm drains, and they have created parks in low-lying sink basins, rather than allowing structures to be built that would be vulnerable to flooding. But this porous limestone underlayment can cause headaches for city managers, especially when new sinkholes pop up in unsafe spots close to houses.

"We don't want kids falling into sinkholes, we don't want pets falling into sinkholes, we don't want the guy mowing his grass falling in a sinkhole," said Buerck.

So, when a new sinkhole collapses, a contractor digs it out, installs an engineered drain that allows surface water to flow directly into the cave stream below, then he refills the hole and seeds the lawn. A wire cone goes on top of the drain to keep out debris and small animals. The city currently manages more than 300 sinkholes in this way.



Karst terrain in Perry County is among North America's most concentrated. There are nearly 700 caves, topped by thousands of sinkholes.

Grotto sculpin and habitat

Rural landowners have also developed adaptations. Steep, deep sinkholes in a pasture are dangerous to livestock, so owners have historically filled sinkholes with whatever was available to make them safer. Some farmers have created more tillable land by installing vertical drains in sinkholes, similar to those used in Perryville lawns. These methods improve aboveground land use, but can funnel toxins and trash into the caves below.

In the 1800s, county boosters touted the sinkholes and caves as a great way to dispose of household sewage. That practice was discontinued long ago, and the current sewage treatment plant has served Perryville since 1977.

However, rural sinkholes continued to be used for trash dumps, and caver Richard Young says that some area caves he entered in the 1960s and 1970s smelled of sewage.

CAVE BUBBLES, MAN DESCENDING TO CAVE, MAP: DENISE HENDERSON VAUGHN; TIRES IN SINKHOLE: PERRY COUNTY REPUBLIC MONITOR; GROTTO SCULPIN AND HABITAT: NOPPADOL PAOTHONG

Many Perry County citzens took cleanup into their own hands. Above: Longtime Perry County landowner Chuck Romig tells how his father and grandfather allowed trees and brush to grow around sinkholes like this one to protect the soil. The family recently sold their farm so it could be added to the Blue Spring Branch Conservation Area. Right: Perryville City Administrator Brent Buerck shows one of many wire cones that are put on top of sinkhole drains.

Crevice Cave, at 30-plus miles, is the longest known cave in Missouri.

While exploring the formerly polluted cave under Perryville in 2015 and 2016, cavers found dramatic improvement in water quality as well as thriving salamanders, frogs, many invertebrates, and the grotto sculpin.

Grotto Sculpin Stirs Controversy

For most residents, the caves they live above were out of sight and mind until recent years. Attention on caves started in the 1990s, when researchers determined that the sculpin inhabiting Perry County cave streams was a completely different species than the common banded sculpin that lives in nearby surface streams.

In the early 2000s, following two mass die-offs of the newly discovered grotto sculpin (*Cottus specus*), MDC biologists tested groundwater in Perry County cave streams. They found many water samples with low dissolved oxygen, high pH, high nitrates, and high phosphorus. Concentrations of Atrazine were very high at many sites. E. coli bacteria, which originates from the feces of both animals and people, was found in both groundwater and surface streams.

Water quality concerns were "the primary threat to conservation of the grotto sculpin," said Shauna Marquardt, with USFWS. But that agency met stiff local resistance when staffers began the process of listing the fish as endangered.

"People here, when the issue was first brought up, were pretty upset," said reporter Crystal Lyerla, who wrote about the issue for the *Perry County Republic-Monitor*. "Nobody wants bad water quality. But nobody here wants federal regulation either."

So local people "chose to take action and clean it up on their own," she said.

Leaders Act to Improve Water Quality

A grassroots community group formed that was "diverse and eclectic," Marquardt said. Their effort was "really inspiring. It's largely unprecedented, the way they took ownership of the issue," she said.

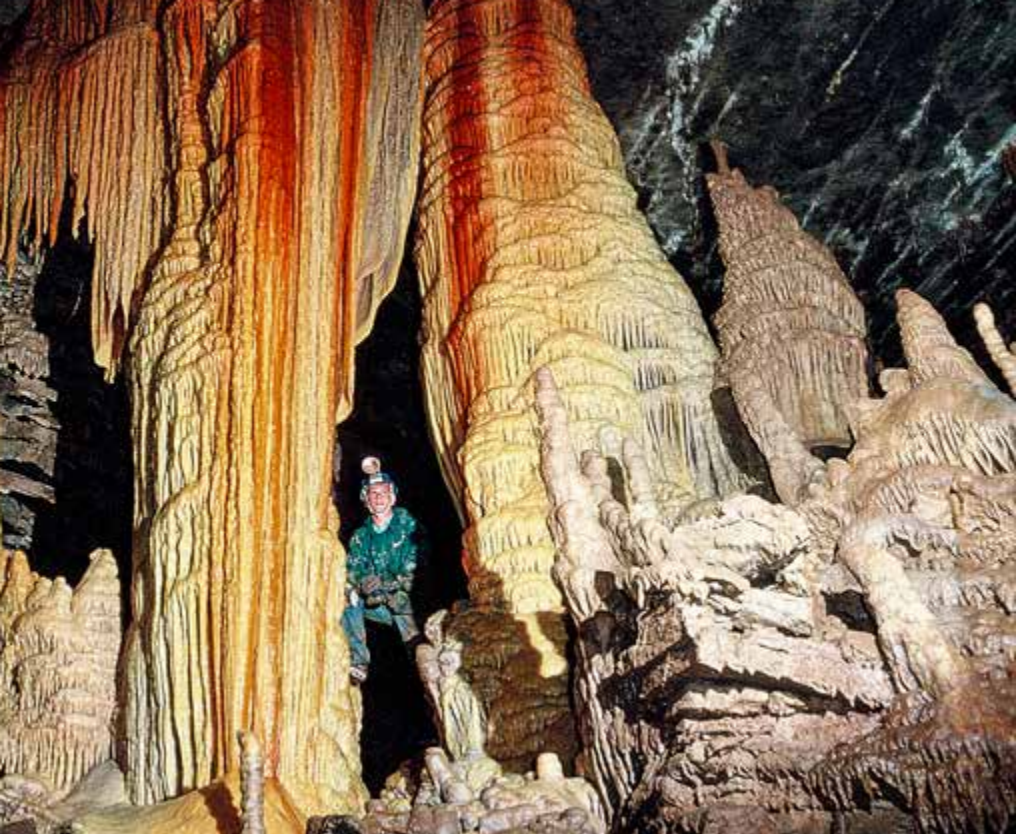
When USFWS finalized the grotto sculpin's endangered status, the agency did not impose top-down regulations. Instead, they accepted the Perry County group's plan to voluntarily improve groundwater quality. The plan incorporated new practices as well as actions residents had undertaken for decades.

In city parks, workers removed concrete and rock around sinkholes, then planted native vegetation. These buffer zones filter sediment out of the sinkholes. Some ranchers fenced to exclude livestock from sinkholes.

MDC organized sinkhole cleanups that excavated nearly 3,000 tires and roughly 400 tons of decades-old refuse from private lands. One participating landowner reported removing two semi-loads of metal, old cars, trash, and hundreds of tires from nearly 50 sinkholes.

The 560-acre Blue Spring Branch Conservation Area is being managed to protect water quality in Berome Moore Cave, which runs directly beneath it. MDC, with the L-A-D Foundation, is planting native vegetation to filter rainwater before it enters the many sinkholes there.

LANDOWNER: DENISE HENDERSON VAUGHN; SINKHOLE DRAIN, CAVE WORMS, FROG, SALAMANDER: NEIL ROSENBAUM; CREVICE CAVE: RICHARD YOUNG; RESEARCHER, GROTTO SCULPIN: NOPPADOL PAOTHONG



Is It Working?

Following the grotto sculpin controversy and the many improvement efforts, Perryville officials were anxious in the spring of 2015 when they unlocked gates so Cave Research Foundation volunteers could explore city caves.

"We opened the caves back up for the first time in a long time," said Buerck, the city administrator. Were the efforts really working, he wondered. "We now had the endangered species to worry about. And what happens if it wasn't working?"

Cavers, including Richard Young, entered the cave he had explored more than 20 years earlier.

"We were delighted to discover that it was dramatically improved," Young said. "There was no foul odor, no smell of detergent, the water was free of soap suds." He noticed a large decline in the amount of trash. The cavers saw beetles, flatworms, cave salamanders, crustaceans, and frogs.

To find this variety of cave life, Young said, "suggests to us that the city has made tremendous inroads in the management of waste, and these caves formed immediately beneath an urban setting are becoming once again relatively pristine natural environments."

Late in 2016, MDC biologists located 11 grotto sculpin egg nests in two Perry County caves. The numerous nests could be attributed to habitat improvement within the caves, said MDC Fisheries Biologist Jason Crites. Sediment increases can be detrimental to successful spawning and nesting, "so if we can reduce sediments through sound erosion control practices, we are likely reducing any pollutant bound to those sediments," he said.

Recent estimates show grotto sculpin numbers close to counts done in the early 2000s, before the two big fish kills, "so we feel we currently have stable populations," Crites said. No known fish kills have occurred in recent years.

A multi-year study of grotto sculpin behavior is underway, which is looking at how far these fish travel, their nesting habits, and population factors. A new round of water quality studies is determining the condition of certain streams that were previously considered impaired.

The combination of research and citizens embracing previously neglected caves is driving continued improvements in water quality in the caves and the health of their ecosystems.

Improvements Continue

Perry County residents are doing even more to embrace their previously neglected caves. In 2018, voters approved a new sewage treatment plant, now under construction. Bat-friendly cave gates have been installed. Inexperienced cavers can sign up with the city's parks department for safe, guided outings in wild caves. Additional cleanups have occurred, particularly along Blue Spring Branch, in an area known to be frequented by the grotto sculpin.

City and county officials are proud of the progress, said Buerck. "But we're not done yet." Some sinkholes still need cleaning, more vegetative buffers are needed, certain cave entrances need safety gates, and some agricultural activity is still taking place too close to sinkholes, he said. Some rural household drains are known to still be discharging into sinkholes and caves, and E. coli bacteria continues to be a concern in streams and groundwater, Crites added.

"When Perry County learned that we have a grotto sculpin," Buerck said, "we went through a huge process and we learned a lot of things about ourselves. We learned that the water we're drinking is the same water the fish is swimming in. So, essentially what we've done as a community is changed the conversation from how do we save this fish that you can't eat or even use for bait to how do we protect our drinking water?"

When caving recently, Young said, he's seeing cave streams in good condition, ample cave life, and no obvious indication of septic drains or signs of new trash dumping into sinkholes. What's more, cavers are receiving requests to help find or map caves on private property where they were previously not allowed.

"I'm really encouraged to see attitudes evolving in a positive, constructive direction," Young said. Landowners "now seem to take interest in the karst structures on their properties," and "for many, the lowly grotto sculpin has become a source of local pride." ▲

Denise Henderson Vaughn is a science writer specializing in Ozark natural resources, particularly forests and karst topography. Working from her home on a tributary of the Jacks Fork River, she tells stories in print, with maps, on interpretive signs, and through podcasts and documentaries.

Karst in Perry County: A Documentary

The intersection of Perry County's unusual karst terrain and residents' adaptations to it — including their encounter with the grotto sculpin — is recounted in an 18-minute video *Karst in Perry County*. It shows the county's panoramic scenery, reveals the grotto sculpin's dark and watery world, highlights the glittering caves, and takes flight to display the tree-ringed sinkholes that dot the county's huge karst plain. You'll meet cavers, landowners, and local officials who tell how the community rose above the sculpin dispute to devise their own plan to protect groundwater quality for the sculpin and for themselves. The video may be viewed free online at **ladfoundation.org/perry-county-karst**.

WATERFALL: DENISE HENDERSON VAUGHN; RESEARCHER KNEELING: NEIL ROSENBAUM; GROUP FILMING: KEN GRUSH; RESEARCHER WALKING: NOPPADOL PAOTHONG

Tapping Into New Traditions

MAPLE SUGARING
SWEETENS OUTDOOR ACTIVITIES
FOR GENERATIONS

by Matthew Dollard | photographs by Cliff White

High on a bluff overlooking the Salt River near Santa Fe sits a piece of ground that means a lot to my family. It was purchased by my great-grandfather some seven decades ago, and the cabin he built there has been a hub for generations of time well-spent outdoors. It has produced countless memories and hunting and fishing opportunities. But we've discovered another of its precious exports in recent years — little amber-colored jars of all-natural maple syrup.

Of course, the end product takes some work, but the process is fairly simple and with a modest cost in start-up equipment, maple sugaring is a fun and accessible way to be out in nature and share a bit of that place with family and friends who are lucky enough to receive a jar.

It's easy to imagine my great-grandpa Harry smiling at the new annual tradition — a time to get together in a place we love, with the potent and delicious smell of boiling maple sap in our noses.

A Tradition Begins

Harry's son, my grandpa Bud Bartold, was the first in our family to get interested in syrup making after noticing an abundance of sugar maples in the steep country there. He bought taps and bags for sap collection and built a fire-brick oven, or evaporator, for boiling the sap. He's since turned the bulk of responsibility over to the younger folks, namely his nephews Mike and Jeff Bartold, and anyone else who wants to get involved.

This past year we tapped in late February after a cold snap had finally given way to sunnier days. After taking inventory and cleaning up our gear, we spent a day walking the property and the neighboring ones where permission had been granted to tap, taking time to assess the health and maturity of each tree before drilling a hole, placing a steel tap, and hanging a collection bag from each. A highlight of this part of the process was checking back to see how much sap had accumulated.

We returned to the cabin that Friday afternoon for a weekend of boiling, a fairly long procedure that requires plenty of attention to the fire and level of sap in the pan. The first batch was complete Saturday morning in time for samples to be handed out as the rest of the family arrived.

Right: Sunny days in late winter and early spring are ideal for harvesting sap. Below left: After drilling a small hole at about waist height, Jeff Bartold lightly hammers in a steel tap. Below center: The slow but consistent drip of transparent sap is the satisfying proof of a well-tapped tree. The bags hung on the tap will hold up to 2 gallons of sap. Below right: William Bartold patrols the tap line and collects the output in food safe buckets before returning to the boiling station.

Top: The rich aroma of sap boiling over a hot fire can make a pleasant day sublime. Above: A hydrometer is used to measure the liquid density of syrup that is nearing finished.

A Bubbling Business

Like many sugaring operations in Missouri, ours is a small one, but we are able to tap a few dozen trees, and ended up with about 100 gallons of sap this past year that yielded 2.5 gallons of syrup.

There are others in the state that yield hundreds of gallons of syrup, using huge networks of tubing, large holding tanks, and reverse osmosis systems to reduce boiling time. The products of these operations can likely be found in your local farmer's markets.

John Stolwyk, founder of the Missouri Maple Syrup Initiative, a website dedicated to the promotion and advocation of the hobby, has visited nearly two dozen sugaring operations in Missouri, large and small.

He estimates that 1,500 to 2,000 gallons of syrup are produced each year in the state.

"There are those that make it and sell it, and those that are hobbyists, and a lot of it goes on in the middle of nowhere and it's for private consumption, and nobody really knows about it," Stolwyk said. "It's just a family tradition and this is what they do in the winter."

Stolwyk is an avid syrup maker himself and believes Missouri's production of maple syrup could increase tenfold in the next 10 years as more people learn about the resource.

"There's a lot of forests in Missouri where sugar maples are dense enough to warrant tapping and could even become a business for a landowner," he said.

For those wishing to get involved in syrup making, Stolwyk says start small, do your research, and even try to visit an experienced syrup-maker to see how it's done.

The first and perhaps most important step in syrup making is identifying a healthy and mature tree to tap. Sugar maples can be difficult to ID in winter but close attention to the bark will give them away. When drilling, it is important to keep the bit clean and free of debris.

The Process

Maple sugaring is a practice old as time and can be very simple with the right equipment and good timing. Nights with below-freezing temperatures followed by warm sunny days cause movement of sap laterally through the tree as temperatures fluctuate, the way blood is transported in the human body. Lines of sap will sometimes already be visible where birds or insects have done their own drilling for the nutrients.

Positive ID

Sugar maples can be hard to identify in the winter but close attention to the texture of bark, which is light gray and scaly or "furrowed," can give them away. They can grow up to 100 feet tall, with a large, rounded crown, and mainly occur in moist to dry upland forests, in steep country, and near streams.

Got a sweet tooth?

Then this episode is for you! January and February are great times to get outdoors and taste one of the forest's sweetest gifts — maple syrup. Nature Boost host Jill Pritchard talks with Rockwoods Reservation's Amy Wilkinson to learn how to tap sugar maple trees to make delicious syrup. Find maple sugaring events and more information at **moconservation.org**!

After many buckets of sap are boiled down over the wood stove, the concentrated syrup is finished over a propane stove for added control of heat. The final product is cooled, bottled, and can later be divided amongst friends and family. The melted sugar spoils left in the pan after bottling make quite the treat for a lucky few.

Step by Step

It is important to keep the health of the tree in mind when choosing which ones to tap. A mature tree, with a diameter of at least 10 inches, is best. Larger specimens may be able to support up to three taps in a single season according to MDC's *Guide to Backyard Maple Sugaring* (available online at **short.mdc.mo.gov/ZJW**).

A shallow hole, 1.5 to 2 inches, is drilled some 4 feet from the base of the tree. A 5/16-inch bit is most often used but this will depend on the width of your taps. Maintain a clean and steady motion when drilling and try to keep the area clear of debris. Cleaning the drill bit after each use can help to avoid the spread of disease from tree to tree. Avoid dead or rotten portions.

After inserting a tap, otherwise referred to as a spile, a bag or bucket should be hung or placed below, and time allowed for sap to accumulate. Tube systems can also be used for collecting large quantities or where access is difficult. Keep in mind that sap can go bad if not cooked, frozen, or refrigerated within 72 hours.

At about 3 percent sugar content, 40 gallons of sap will produce 1 gallon of syrup, which is around 67 percent sugar, so have plenty of sap ready to go. Preheating before adding to a running boil can help to maintain a more constant temperature. Although the bulk of boiling is most often done over firewood, finishing each batch is easiest with a propane stove for added heat control. It is beneficial at this point to have tools such as a candy thermometer or hydrometer, which measures liquid density. Finished syrup has a temperature of 219 degrees F. It is often said that when the entire surface of the batch has bubbled, it is complete.

You are now ready to filter and jar your syrup for a year's worth of pleasure. ▲

Matthew Dollard is a union laborer who enjoys hunting, trapping, fishing, and learning in the outdoors.

Get Outside in FEBRUARY

Buckbrush fruit

Ways to connect with nature

Ozark witch-hazel

The Colors of February

Come February, Missouri is still draped in the drab hues associated with winter. But a few pops of color dot the landscape, cheering us on until spring. Can you find these sources of color?

- Ozark witch-hazel (*Hamamelis vernalis*), which blooms in January through April, is usually Missouri's first native plant to flower.
- The fruits of buckbrush, or coral berry, are enjoyable to see when everything else is drab. These berries are not a favorite food of most animals, but as winter wears on and food becomes scarce, they seem to become more palatable.

VIRTUAL

Trees: Sap to Syrup

Tuesday • Feb. 15 • 6:30–7:30 p.m.
Online only
Registration required by Feb. 4 at 888-283-0364 or at short.mdc.mo.gov/4kZ
Ages 10 and older

Winter is full of wonder and processing tree sap into syrup is one of those wonders. This virtual program will cover the basics of tree selection, collection, processing, and equipment needed to turn that watery sap into delicious syrup.

Baby on Board

Opossums mate and bear young in February. Opossums mate during the first three weeks of February, and most litters are produced toward the end of February. At birth, young opossums are less than ½ inch long, and complete their development in their mother's pouch. The young are weaned sometime in May.

Natural Events to See This Month

Here's what's going on in the natural world.

Woodchucks emerge from hibernation

Black bear cubs are born in winter dens

Geese migrate through Missouri

Find more events in your area at **mdc.mo.gov/events**

KANSAS CITY REGION

Native Landscape Chat

Friday • Feb. 4 • 1–2 p.m.
Anita B. Gorman Conservation Discovery Center,
4750 Troost Ave., Kansas City, MO 64110
Registration required by Feb. 4 at 888-283-0364 or at short.mdc.mo.gov/4kZ
Ages 14 and older

February is a great time to gear up for spring planting. Bed prep, plant choice, and layout design are all important to the success of native plant gardens. Visit with our native landscape specialists to get tips on how to prep for spring.

Groundhog Day

Today's legend says if the groundhog sees its shadow on Feb. 2, we'll have six more weeks of winter. No shadow means an early spring. The gist of this is, if it's sunny on this day, we'll have six more weeks of winter. Did you know, old time Ozarkers had Feb. 14 as the magical day, not Feb. 2?

Salamanders on the Move

Encouraged by warm rains and rising air temperatures (above 50 degrees), spotted salamanders congregate in fishless ponds to breed from late February to mid-March. Spotted salamanders are voracious predators of insects, worms, and slugs.

Walleye move onto shoals for spawning

Boxelder bugs seen on warm days

BUCKBRUSH FRUIT: PHOTO 214024538 / © IVA VILLI | DREAMSTIME.COM; BOXELDER: WILLIAM M. CIESLA, FOREST HEALTH MANAGEMENT INTERNATIONAL, BUGWOOD.ORG

Places to Go

NORTHWEST REGION

Monkey Mountain Conservation Area

Primate free, but lots of outdoor opportunity

by Larry Archer

On a late winter visit to northwest Missouri's Monkey Mountain Conservation Area (CA), one can find roughly 7 miles of service roads suitable for hiking, river frontage for fishing, coyotes, bobcats, eagles, and migrating waterfowl from the adjacent river bottom flatlands. What one won't find — any time of year — are monkeys.

Located along the Missouri River on nearly 1,600 acres in Andrew and Holt counties, Monkey Mountain CA has much to offer, just not the tree-swinging primates suggested in the name, said Resources Management District Supervisor Sean Cleary, who oversees the area.

"They named it Monkey Mountain because the bluffs were deemed so steep that even monkeys couldn't climb them," Cleary said.

And while the bluffs are inaccessible, the area's six parking lots linking to service roads make the area very approachable to anyone who doesn't mind the challenge of a few hills.

The payoff, especially before the forest's canopy returns in the spring, are some expansive views of the river bottoms, he said.

"There's a savanna area, it has mature trees and grassland understory," he said. "It has a high point where you can see the Nodaway River Valley and the Missouri River Valley."

"A bobcat will probably see you before you see it, but there's a lot of bobcats up in that area."

—Monkey Mountain CA Resources Management District Supervisor Sean Cleary

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MONKEY MOUNTAIN CONSERVATION AREA

consists of 1,581.5 acres in Andrew and Holt counties. From Interstate 29 Exit 67 north of St. Joseph, take Highway 59 west 4 miles, then Route U south 3.5 miles to the area sign, and County Road 325 east for about 1 mile.

39.9322, -95.0199

short.mdc.mo.gov/4kT 816-271-3100

WHAT TO DO WHEN YOU VISIT

Birdwatching The eBird list of birds recorded at Monkey Mountain CA is available at **short.mdc.mo.gov/4kq**.

Camping Boat-in along Missouri River; individual campsites.

Fishing Catfish

Hunting **Deer** (archery and firearms — antlerless permits not allowed) and **turkey** (archery and firearms). Regulations are subject to annual changes. Refer to MDC's regulation page online at **short.mdc.mo.gov/Zjw** for regulations.

Also **quail**, **rabbit**, and **squirrel**

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WHAT TO LOOK FOR WHEN YOU VISIT

Coyote

Bobcat

Bald eagle

Snow goose

Wild Guide

Redfin Pickerel (Grass Pickerel)

Esox americanus

Status	Size	Distribution
Common	Length: 10–12 inches, max 14 inches; Weight: ¾ pound	Southeastern Lowlands, Ozarks

Did You Know?
Redfin pickerel seldom reach a size that pique anglers' interest. However, their sleek, muscular, torpedo-shaped bodies, with fins positioned in the back for quick bursts of speed, perfect for their lie-in-wait predatory biology, is worthy of admiration.

Redfin pickerel, also known as grass pickerel, have duckbill-shaped snouts, large mouths with many sharp teeth, and a single dorsal fin, much like other pikes. Redfin pickerel prefer clear water, little current, and thick vegetation. They can be found in the Southeastern Lowlands in natural lakes, sloughs, borrow pits, and sluggish sections of ditches and streams. In the Ozarks, they frequent creeks, spring pools, protected inlets, and overflow waters along major streams.

LIFE CYCLE

Spawning occurs in late February and early March, and possibly in late fall or early winter. Eggs are broadcast over submerged vegetation without preparation of a nest, and there is no parental care of the eggs or young. Females grow faster and live longer than males. Redfin pickerel rarely live more than three or four years.

FOODS

Young redfin pickerel eat small crustaceans and young aquatic insects. Larger pickerel eat small fish, crayfish, and dragonfly nymphs. Like other pikes, this carnivorous species hunts by ambush, darting out to seize prey from a place of concealment.

ECOSYSTEM CONNECTIONS

Members of the pike family, like redfin pickerel, are important predators in aquatic ecosystems, serving to limit populations of nongame fishes that might become too large to be consumed by other common predators, such as bass.

Outdoor Calendar

MISSOURI DEPARTMENT OF CONSERVATION

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FISHING

Black Bass

Impounded waters and non-Ozark streams:
Open all year

Most streams south of the Missouri River:

- Catch-and-Keep:
  May 22, 2021–Feb. 28, 2022
- Catch-and-Release:
  March 1–May 27, 2022

Nongame Fish Gigging

Impounded Waters, sunrise to sunset:
Feb. 16–Sept. 14, 2022

Streams and Impounded Waters, sunrise to midnight:
Sept. 15, 2021–Feb. 15, 2022

Paddlefish

Statewide:
March 15–April 30, 2022

On the Mississippi River:
March 15–May 15, 2022
Sept. 15–Dec. 15, 2022

Trout Parks

During the catch-and-release season, state trout parks (except Maramec Spring Park) are open only Friday–Monday.

Catch-and-Release:
Nov. 12, 2021–Feb. 14, 2022

Catch-and-Keep:
March 1–Oct. 31, 2022

TRAPPING

Beaver, Nutria

Nov. 15, 2021–March 31, 2022

Otters, Muskrats

Nov. 15, 2021–Feb. 20, 2022

For complete information about seasons, limits, methods, and restrictions, consult the *Wildlife Code of Missouri* at **short.mdc.mo.gov/Zib**. Current hunting, trapping, and fishing regulation booklets are available from local permit vendors or online at **short.mdc.mo.gov/ZZf**.

HUNTING

Coyote

Restrictions apply during April, spring turkey season, and firearms deer season.

Open all year

Crow

Nov. 1, 2021–March 3, 2022

Deer

Archery:
Sept. 15–Nov. 11, 2022
Nov. 23, 2022–Jan. 15, 2023

Firearms:

- Early Youth Portion (ages 6–15):
  Oct. 29–30, 2022
- November Portion:
  Nov. 12–22, 2022
- Late Youth Portion (ages 6–15):
  Nov. 25–27, 2022
- Antlerless Portion (open areas only):
  Dec. 3–11, 2022
- Alternative Methods Portion:
  Dec. 24, 2022–Jan. 3, 2023

Rabbit

Oct. 1, 2021–Feb. 15, 2022

Squirrel

May 22, 2021–Feb. 15, 2022

Turkey

Firearms:

- Youth (ages 6–15): April 9–10, 2022
- Spring: April 18–May 8, 2022
- Fall: Oct. 1–31, 2022

Archery:
Sept. 15–Nov. 11, 2022
Nov. 23, 2022–Jan. 15, 2023

Waterfowl

See the Migratory Bird and Waterfowl Hunting Digest *or visit short.mdc.mo.gov/ZZx for more information.*

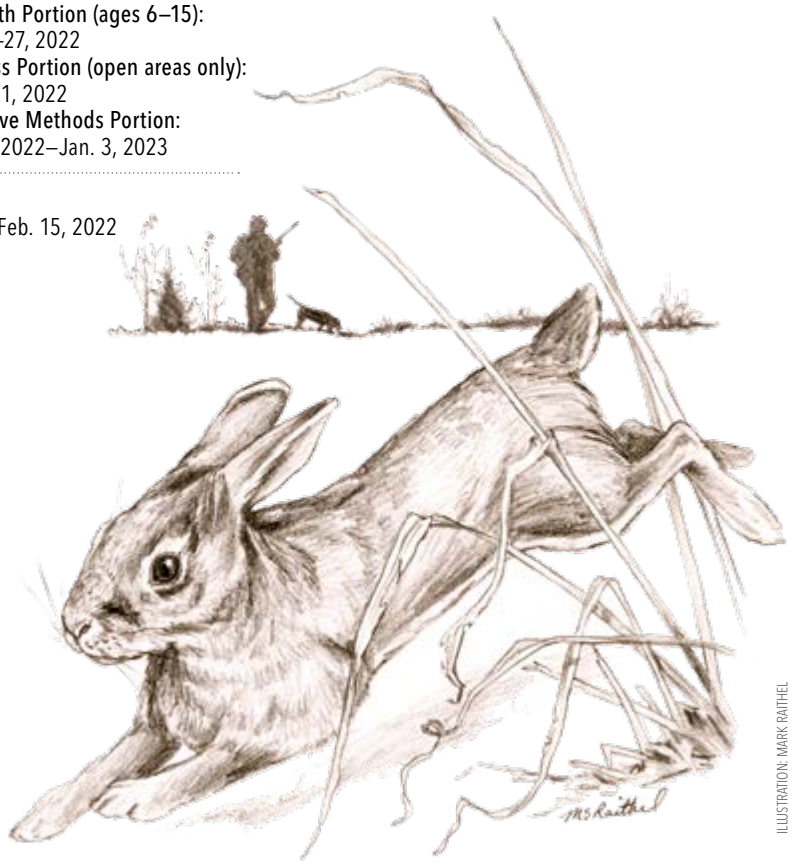

ILLUSTRATION: MARK RAITHEL

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The morning sun peeks through the clouds to warm the Mississippi River, which is covered in winter's chill. Don't let cool temperatures keep you indoors. Get out and let the sun warm you as you discover nature.

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